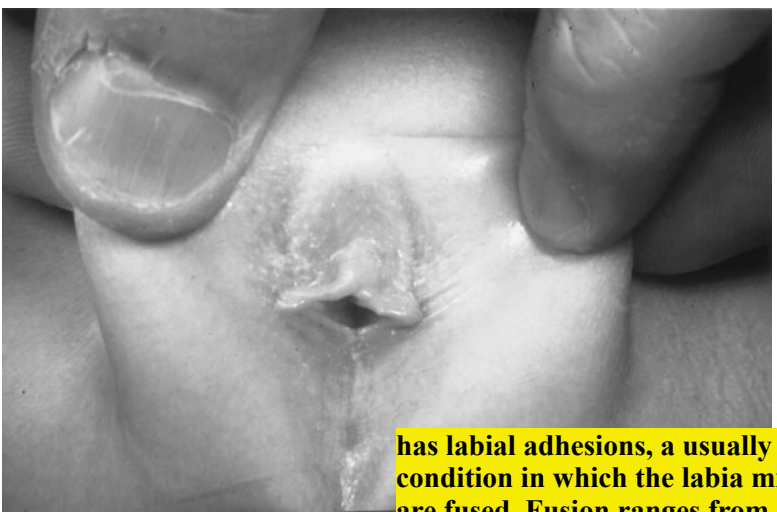
# The Urinary Tract

د.ايمان نبيل محمد
طب عام ج/الكوفةَ

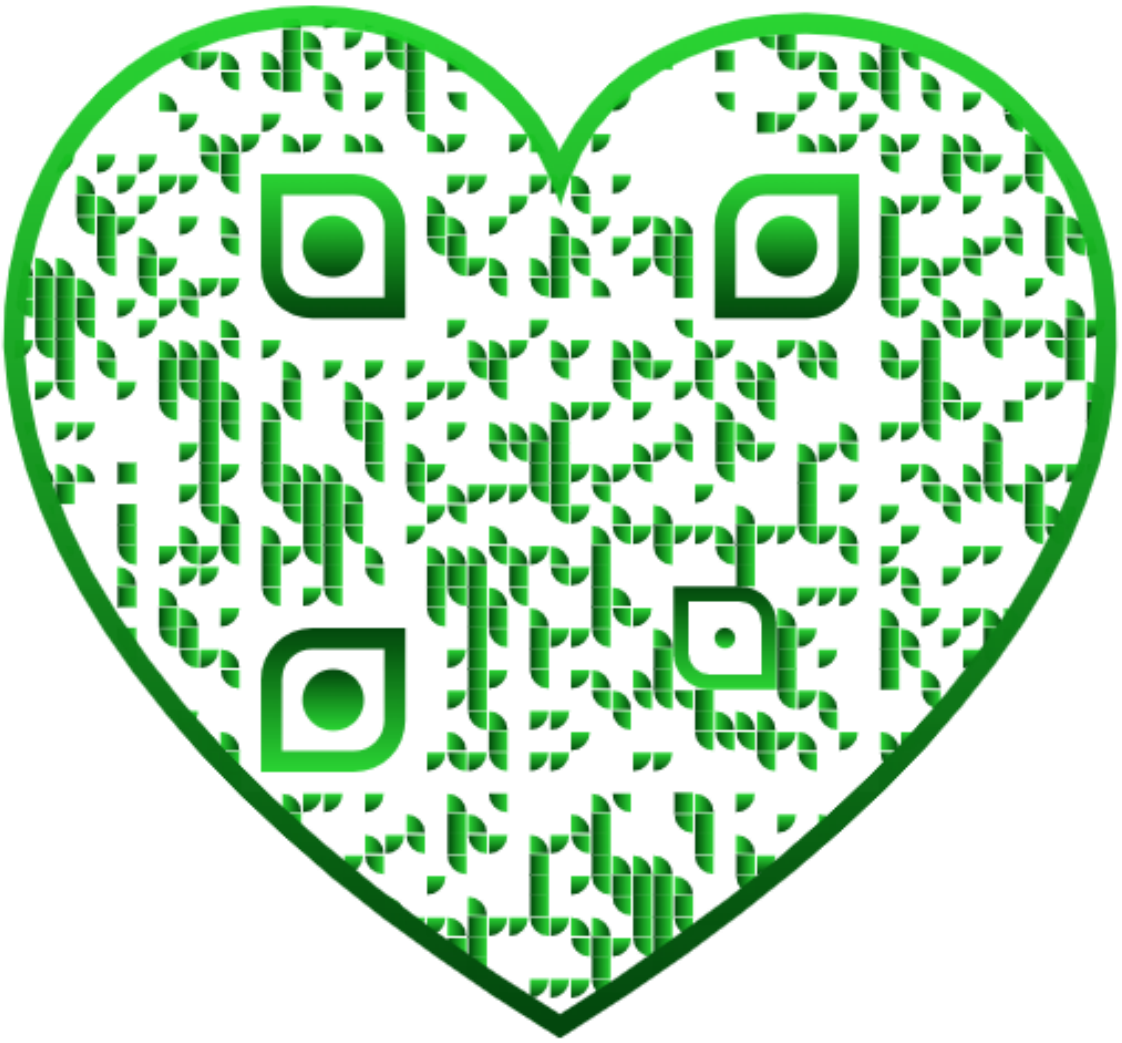
**278.** You are seeing a 4-year-old girl with the physical examination finding shown below. She has no significant past history. The most appropriate management is which of the following?



*(Courtesy of Michael L. Ritchey, MD.)*

**has labial adhesions, a usually benign condition in which the labia minora are fused. Fusion ranges from a small area to the entire area between the clitoris and the fourchette.**

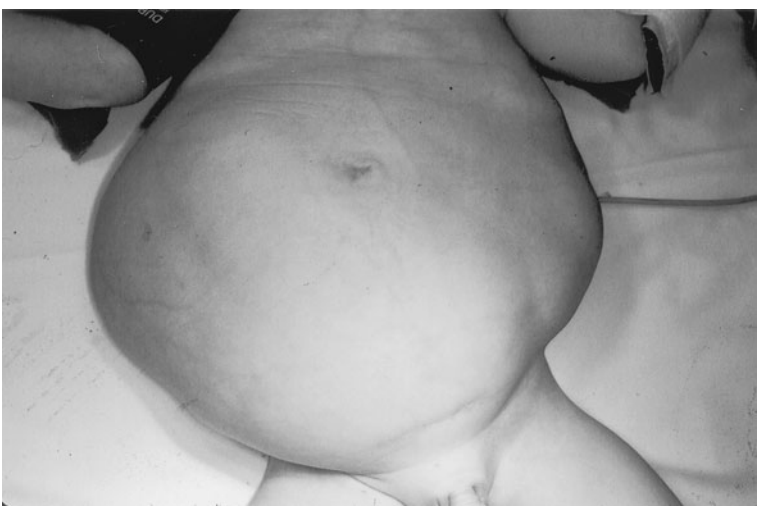
a. Surgical consultation for correction
b. Topical estrogen cream daily for a week
c. Topical steroid cream for a week
d. Referral to social services for possible sexual abuse
e. Karyotype studies



**279.** At the 2-week checkup of a term female infant, the mother reports a grayish and sometimes bloody vaginal discharge since birth. The infant's mother and grandmother are the only caretakers. Examination of the external genitalia reveals an intact hymen with a thin grayish mucous discharge. Which of the following is the most appropriate next step?

a. Parental reassurance
b. MRI of the brain
c. Ultrasound of the abdomen
d. Gonorrhea and chlamydial swabs
e. Referral to social services for possible sexual abuse

**280.** The delivery of a newborn boy is remarkable for oligohydramnios. The infant (pictured) is also noted to have undescended testes and clubfeet, and to be in respiratory distress. Which of the following is the most likely diagnosis to explain these findings?



*(Courtesy of Michael L. Ritchey, MD.)*

a. Surfactant deficiency
b. Turner syndrome
c. Prune belly syndrome
d. Hermaphroditism
e. Congenital adrenal hyperplasia

**281.** A 17-year-old boy is brought to the emergency department by his parents with the complaint of coughing up blood. He is stabilized, and his hemoglobin and hematocrit levels are 11 mg/dL and 33%, respectively. During his hospitalization, he is noted to have systolic blood pressure persistently greater than 130 mm Hg and diastolic blood pressure greater than 90 mm Hg. His urinalysis is remarkable for hematuria and proteinuria. You are suspicious the patient has which of the following?

a. Hemolytic-uremic syndrome
b. Goodpasture syndrome
c. Nephrotic syndrome
d. Poststreptococcal glomerulonephritis
e. Renal vein thrombosis

**282.** A 1-year-old child presents with failure to thrive, frequent large voids of dilute urine, excessive thirst, and three episodes of dehydration not associated with vomiting or diarrhea. Over the years, other family members reportedly have had similar histories. Which of the following is the most likely diagnosis?

a. Water intoxication
b. Diabetes mellitus
c. Diabetes insipidus
d. Child abuse
e. Nephrotic syndrome

**283.** A 6-month-old infant has poor weight gain, vomiting, episodic fevers, and chronic constipation. Laboratory studies reveal a urinalysis with a pH of 8.0, specific gravity of 1.010, 1+ glucose, and 1+ protein. Urine anion gap is normal. Serum chemistries show a normal glucose and a normal albumin with a hyperchloremic metabolic acidosis. Serum phosphorus and calcium are low. What is the best diagnosis to explain these findings?

a. Renal tubular acidosis type 1
b. Renal tubular acidosis type 3
c. Renal tubular acidosis type 4
d. Hereditary Fanconi syndrome
e. Congenital nephrotic syndrome

**284.** The mother of a 2-year-old male child states that she has noticed white, cheeselike material arising from his foreskin and also that he cannot fully retract the foreskin behind the glans penis. Which of the following is the correct advice for this parent?

a. The child has phimosis and requires a circumcision.
b. The child has paraphimosis, and in addition to a circumcision, likely has an infection requiring topical antibiotics.
c. The child is normal.
d. The child likely has a previously undiagnosed hypospadias.
e. Ultrasound of kidneys, bladder, and ureters is indicated to check for unidentified associated defects.

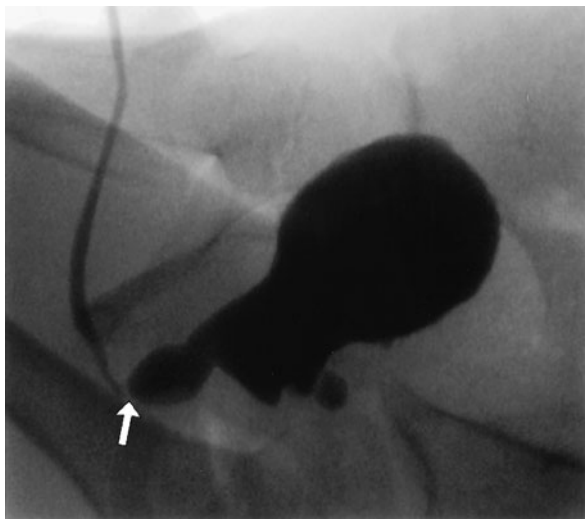
**285.** After her first urinary tract infection, a 1-year-old has a voiding cystourethrogram with findings shown below. Which of the following is the most appropriate treatment option?

*(Courtesy of Susan John, MD.)*

a. Low-dose daily antibiotics
b. Immediate surgical reimplantation of the ureters
c. Weekly urinalyses and culture
d. Diet low in protein
e. Early toilet training

Grade I VUR is reflux of urine into an undilated ureter.
Reflux into the ureter and collecting system without dilatation is calledgrade II.
Grade III lesions have dilatation of the ureter and collecting system without blunting of the calyces.
Grade IV lesions are characterized by blunting of the calyces,
grade V lesions demonstrate even more dilatation and tortuosity of the ureter.
✅Low-grade lesions (grade I and grade II) are conservatively managed with close observation, daily low-dose antibiotics, and urinalyses and cultures every 3 to 4 months.
✅Grade V lesions (and some grade IV lesions) require surgical reimplantation of a ureter if the findings persist. Lesions in between these two extremes are treatment dilemmas.

**286.** Physical examination of a baby boy shortly after birth reveals a large bladder and palpable kidneys. The nurses note that he produces a weak urinary stream. A voiding cystourethrogram is shown below. He appears to be otherwise normal. Which of the following is the most likely diagnosis?



*(Courtesy of Susan John, MD.)*

a. Ureteropelvic junction obstruction
b. Posterior urethral valve
c. Prune belly syndrome
d. Duplication of the collecting system
e. Horseshoe kidney

**287.** A 5-year-old girl without past history of UTI is in the hospital on antibiotics for *Escherichia coli* pyelonephritis. She is still febrile after 4 days of appropriate antibiotics. A renal ultrasound revealed no abscess, but a focal enlargement of one of the lobes of the right kidney. CT of the abdomen reveals a wedge-shaped area in the right kidney distinct from the normal tissue with minimal contrast enhancement. Appropriate management of this patient includes which of the following interventions?

a. Prolonged antibiotic therapy
b. Routine treatment with 10 to 14 days of antibiotics for pyelonephritis
c. Surgical consultation
d. Dimercaptosuccinic acid (DMSA) scan
e. Renal biopsy

**The patient in the question has acute lobar nephronia, which is in the middle of the spectrum between pyelonephritis and renal abscess. Patients have prolonged fever curves despite appropriate antibiotics. A CT scan is most useful in diagnosing nephronia, but a renal ultrasound can identify the process as well. Treatment is prolonged IV and then PO antibiotics. Shorter courses like the typical treatment for pyelonephritis can lead to recurrence and renal abscess. Surgery and biopsy are not necessary, and a DMSA scan,**

**288.** A 4-year-old boy, whose past medical history is positive for three urinary tract infections, presents with a blood pressure of 135/90 mm Hg. He is likely to exhibit which of the following symptoms or signs?

a. Multiple cranial nerve palsy
b. Headache
c. Hyporeflexia
d. Increased urine output
e. Right ventricular hypertrophy

**Blood pressures in children must be interpreted in relation to the child's age and height**

**289.** The 1-year-old boy in the photograph below, who recently had a circumcision, requires an additional operation on his genitalia that will probably eliminate his risk of which of the following?

*(Courtesy of Michael L. Ritchey, MD.)*

a. Testicular malignancy
b. Decreased sperm count
c. Torsion of testes
d. Urinary tract infection
e. Epididymitis

**290.** A 6-week-old child is being evaluated for a fever of unknown etiology. As part of the laboratory evaluation, a urine specimen was obtained that grew *E coli* with a colony count of 2000/μL. These findings would be definite evidence of a urinary tract infection if which of the following is true about the sampled urine?

a. It has a specific gravity of 1.008.
b. It is from a bag attached to the perineum of an uncircumcised boy.
c. It is from an ileal-loop bag.
d. It is from a suprapubic tap.
e. It is the first morning sample.

**291.** A boy has returned home from visiting his grandmother in a rural area. He spent most of his time swimming, playing in the yard, helping in the gardens, and chasing his Chihuahua; his grandma says "he was generally dirty!" He was noted 2 weeks ago to have "infected mosquito bites" on his neck and chin for which the local doctor had him just scrub with soap; a few remain and are shown in the photograph below. His mother brings him into the office with the complaint of dark urine, swelling around his eyes, and shortness of breath. You also find him to have hypertension and hepatomegaly. Which of the following is the most likely cause of his problem?

*(Courtesy of Adelaide Hebert, MD.)*

a. IgA nephropathy
b. Poststreptococcal glomerulonephritis
c. Idiopathic hypercalciuria
d. Pyelonephritis
e. Sexually transmitted disease

**Acute poststreptococcal glomerulonephritis follows a skin or throat infection with certain nephritogenic strains of group A β-hemolytic streptococci; the photograph demonstrates impetigo. Hematuria often colors the urine dark, and decreased urinary output can result in circulatory congestion from volume overload with pulmonary edema, periorbital edema, tachycardia, and hepatomegaly; these complications are avoided by fluid restriction. Acute hypertension is common and can be associated with headache, vomiting, and encephalopathy with seizures.**

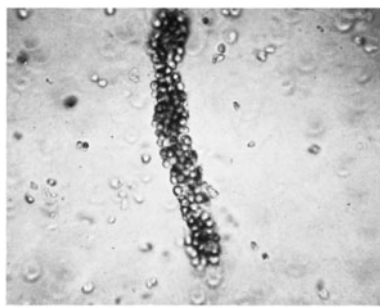
**292.** A 4-year-old boy and his family have recently visited a local amusement park. Several of the family members developed "gastroenteritis" with fever and diarrhea, but the 4-year-old's stool was slightly different, as it contained blood. His mother reports that in the past 24 hours he developed pallor and lethargy; she relates that his face looks swollen and that he has been urinating very little. Laboratory evaluation reveals a hematocrit of 28% and a platelet count of 72,000/μL. He has blood and protein in the urine. Which of the following diagnoses is most likely to explain these symptoms?

a. Henoch-Schönlein purpura
b. IgA nephropathy
c. Intussusception
d. Meckel diverticulum
e. Hemolytic-uremic syndrome

**293.** A 6-year-old girl is brought to the emergency room because her urine is red. She has been healthy her whole life, and has recently returned from an outing with her grandmother to a local amusement park. Her urine dip for heme is positive, suggesting which of the following is a possibility?

a. Ingestion of blackberries
b. Ingestion of beets
c. Phenolphthalein catharsis
d. Presence of myoglobin
e. Ingestion of Kool-Aid

**294.** The photomicrograph below is of a urine specimen from a 15-year-old girl. She has had intermittent fever, malaise, and weight loss over the previous several months. Recently she has developed swollen hands, wrists, and ankles, the pain of which seems out of proportion to the clinical findings. She also complains of cold extremities and has some ulceration of her distal digits. Which of the following laboratory tests is most likely to assist in the diagnosis of this condition?



**depicts a red blood cell cast characteristically found in the urine of patients with glomerular disease. The fever, malaise, and weight loss as well as the arthritis involving mainly small joints are common findings of systemic lupus erythematosus (SLE).**

a. Antibodies to nDNA and Sm nuclear antigens
b. Throat culture for group A β-hemolytic streptococcus
c. Simultaneously acquired urine and serum bicarbonate levels
d. A urine culture
e. Erythrocyte sedimentation rate

**295.** A 12-year-old boy comes to the emergency department at midnight with a complaint of severe scrotal pain since 7 PM. There is no history of trauma. Which of the following is the most appropriate first step in management?

a. Order a surgical consult immediately. **Torsion**
b. Order a radioisotope scan as an emergency.
c. Order a urinalysis and Gram stain for bacteria.
d. Arrange for an ultrasound examination.
e. Order a Doppler examination.

**296.** The mother of a 2-year-old girl reports that her daughter complains of burning when she urinates and that she has foul-smelling discharge from her vagina. She has some slight staining on the front of her underwear, but denies fever, nausea, vomiting, or other constitutional signs. The child does not attend day care, and she has demonstrated no change in behavior. The physical examination is normal with an intact hymen, but the child's vulva is reddened and with a malodorous scent noted. Her urinalysis and culture are normal. Management of this condition includes which of the following?

a. Complete genitourinary (GU) examination under general anesthesia
b. Progesterone cream to the affected area for a week
c. Advice to stop taking prolonged bubble baths
d. Mebendazole to eradicate pinworm infestation
e. Referral to social services for possible sexual abuse

**297.** A 7-year-old boy has cramping abdominal pain and a rash mainly on the back of his legs and buttocks as well as on the extensor surfaces of his forearms. Laboratory analysis reveals proteinuria and microhematuria. You diagnose Henoch-Schönlein, or anaphylactoid, purpura. In addition to his rash and abdominal pain, what other finding is he likely to have?

a. Chronic renal failure
b. Arthritis or arthralgia
c. Seizures
d. Unilateral lymphadenopathy
e. Bulbar nonpurulent conjunctivitis

**Other significant symptoms include edema, arthralgia or arthritis, colicky abdominal pain with GI bleeding, acute scrotal pain, and renal abnormalities ranging from microscopic hematuria to acute renal failure.**

**298.** A 13-year-old boy's scrotum is shown below. He complains of several months of swelling but no pain just above his left testicle. He is sexually active but states that he uses condoms. On physical examination, the area in question feels like a "bag of worms." Which of the following is the most appropriate management for this condition?

*(Courtesy of Michael L. Ritchey, MD.)*

a. Doppler flow study of testes
b. Radionuclide scan of testes
c. Urinalysis and culture
d. Ceftriaxone intramuscularly and doxycycline orally
e. Reassurance and education only at this time

**Varicocele, a common condition seen after 10 years of age, occurs in about 15% of adult males. It results from the dilatation of the pampiniform venous plexus (usually on the left side) due to valvular incompetence of the spermatic vein. Reduced sperm counts are possible with this condition; surgery may ultimately be indicated for infertility problems. Typically, this condition is not painful but can become tender with strenuous exercise. Its typical "bag of worms" appearance on palpation makes its diagnosis apparent in most cases. For a 13-year-old boy, reassurance and education seem appropriate.**

**299.** A 3-day-old infant's scrotum is shown below. Palpation reveals a tense, fluid-filled area surrounding the right testicle. The scrotum transilluminates well, and the amount of fluid does not vary with mild pressure. Which of the following is the most appropriate approach to this condition?

*(Courtesy of Michael L. Ritchey, MD.)*

a. Request a surgical consultation
b. Incision and drainage
c. Administer prophylactic antibiotics
d. Observe only
e. Perform a chromosome determination

**The description is that of a hydrocele, an accumulation of fluid in the tunica vaginalis. Small hydroceles usually resolve spontaneously in the first year of life. Larger ones or those that have a variable fluid level with time will likely need surgical repair. This is a common condition affecting 2% of males; thus, chromosomes are not indicated. Incision and drainage and antibiotics are not indicated for this developmental condition.**

**300.** A 2-year-old patient arrives late to your office with his father and a sign-language translator. They are very apologetic, but the father communicates that he had car trouble at his dialysis center and thus was late picking up the child from day care. The father is concerned about his child's having intermittent red, bloody-looking urine. A gross inspection of the child's urine in your office looks normal, but the dipstick demonstrates 3+ blood. Which of the following is the most likely cause of this child's hematuria?

a. Alport syndrome
b. Berger nephropathy (IgA nephropathy)
c. Idiopathic hypercalciuria
d. Membranous glomerulopathy
e. Goodpasture syndrome

**301.** A 9-year-old boy comes to the office for a pre-participation physical examination for summer camp. His parents report that he still has episodes of bed-wetting. The boy's father confides that he also had bed-wetting until he was 10. They are concerned about the bed-wetting, but they are more concerned about their son's upcoming week at summer camp and that the other boys may harass him for wetting the bed. Which of the following statements about nocturnal enuresis is correct?

a. The condition is three times more common in girls than boys.
b. Most patients with this condition have a psychiatric illness as the cause.
c. Spontaneous cure rates are high regardless of therapy.
d. Family history of this condition is uncommon.
e. Short courses of desmopressin acetate (DDAVP) lead to permanent cure in 50% of cases.

**302.** A 21-year-old woman presents to the emergency room in active labor. She has had no prenatal care, but her last menstrual period was approximately 9 months prior. Her membranes are artificially ruptured, yielding no amniotic fluid. She delivers an 1800-g (4-lb) term infant who develops significant respiratory distress immediately at birth. The first chest radiograph on this infant demonstrates hypoplastic lungs. After this infant is stabilized, which of the following is the most appropriate next step for this infant?

a. Cardiac catheterization
b. Renal ultrasound
c. MRI of the brain
d. Liver and spleen scan
e. Upper GI

**Questions 303 to 306** **303-f, 304-d, 305-a, 306-c.**

For each condition listed below, match the category to which it belongs. Each lettered option may be used once, more than once, or not at all.

a. Nephrotic syndrome
b. Henoch-Schönlein purpura nephritis
c. Bartter syndrome
d. Acute glomerulonephritis
e. IgA nephropathy (Berger nephropathy)
f. Idiopathic hypercalciuria

**303.** An 8-year-old boy with the intermittent complaint of "burning" when he urinates and who has trace blood on his urine dip test.

**304.** A 6-year-old girl with a complaint of "dark urine"; she has a blood pressure of 120/80 mm Hg.

**305.** Elevated levels of cholesterol and triglycerides found in a 6-year-old boy whose mother reports that he has been awakening with puffy eyes each morning. On your physical examination you determine that he has had unexpected weight gain and has scrotal edema.

**306.** A 12-month-old girl whose height and weight are less than the fifth percentile; she has had several bouts of constipation and two previous admissions for dehydration. She is again admitted for dehydration and is noted to have serum potassium of 2.7 mEq/L.

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# The Urinary Tract

## Answers

**278. The answer is b.** *(Kliegman et al, pp 2275-2276.)* The patient pictured has labial adhesions, a usually benign condition in which the labia minora are fused. Fusion ranges from a small area to the entire area between the clitoris and the fourchette. It is most common in young girls who are in the low-estrogen state of preadolescence. Sometimes urine pooling can cause an increased risk of urinary tract infection. Treatment can be merely observation, as the condition should resolve with the estrogenization that occurs with puberty. Nightly application of an estrogen cream for a week resolves this condition in the majority of patients. However, as recurrence is common, patients must be instructed to apply daily petrolatum for a month or two after separation.

**279. The answer is a.** *(Kliegman et al, p 2273. McMillan et al, p 197. Rudolph et al, p 90)*. This patient has a physiologic discharge related to estrogen withdrawal. Examination can exclude vaginal trauma, and the history makes sexual abuse unlikely. Imaging is not indicated at this point. Parents should be reassured that it will resolve in a few weeks.

**280. The answer is c.** *(Hay et al, p 689. Kliegman et al, p 2240. McMillan et al, p 1834. Rudolph et al, pp 1737-1738.)* Prune belly syndrome, a malformation that occurs mostly in males, is characterized by a lax, wrinkled abdominal wall, a dilated urinary tract, and intra-abdominal testes. Additional urinary tract abnormalities include significant renal dysfunction or dysplasia. Oligohydramnios and commonly associated pulmonary complications, such as pulmonary hypoplasia and pneumothorax, are seen. Congenital hip dislocation, clubfeet, and intestinal malrotation with possible secondary volvulus can occur. There does not appear to be a genetic predisposition to prune belly syndrome.

**281. The answer is b.** *(Hay et al, pp 529-530. Kliegman et al, p 2180. McMillan et al, p 1439. Rudolph et al, p 1998.)* The patient in the question has a classic description of Goodpasture syndrome, a rare disease in children.

The pulmonary hemorrhage can be life threatening and the renal function progressive. Diagnosis is suggested by kidney biopsy and finding antibodies to the glomerular basement membrane.

Hemolytic-uremic syndrome presents in a child with fever, bloody diarrhea, and progression toward renal failure but not respiratory symptoms. Nephrotic syndrome presents with edema, hypertension, and proteinuria; respiratory symptoms related to congestive heart failure (and not pulmonary hemorrhage) might be seen. Poststreptococcal glomerulonephritis can result in hematuria, but the respiratory symptoms associated with the condition would be related to congestive heart failure and not to pulmonary hemorrhage. Renal vein thrombosis might result in hematuria but would not be expected to have pulmonary findings.

**282. The answer is c.** *(Hay et al, pp 703-704. Kliegman et al, pp 2200-2201, 2301. McMillan et al, pp 1901-1904. Rudolph et al, p 1714.)* Congenital nephrogenic diabetes insipidus is a hereditary disorder in which the urine is hypotonic and produced in large volumes because the kidneys fail to respond to antidiuretic hormone. Most North American patients thus involved are descendants of Ulster Scots who came to Nova Scotia in 1761 on the ship Hopewell. Males are primarily affected through an X-linked recessive inheritance causing inactivating mutation of the vasopressin V2 receptor; autosomal dominant and recessive forms are also known. The disorder is felt to result from primary unresponsiveness of the distal tubule and collecting duct to vasopressin. Although the condition is present at birth, the diagnosis is often not made until several months later, when excessive thirst, frequent voiding of large volumes of dilute urine, dehydration, and failure to thrive become obvious. Maintenance of adequate fluid intake and diet and use of saluretic medications (promoting the renal excretion of sodium) are the bases of therapy for this incurable disease. Acquired nephrogenic diabetes insipidus can be a result of lithium, methicillin, rifampin, and amphotericin. It may also be seen with hypokalemia, hypercalcemia, polycystic kidney disease, Sjögren syndrome, and sickle-cell disease.

Water intoxication would not present with episodes of dehydration; diabetes mellitus rarely presents with a protracted course in such a young child (it is usually a more acute illness and often with vomiting). Child abuse would be unlikely, especially with a family history as noted. Nephrotic syndrome would be expected to present with other signs such as edema and proteinuria.

**283. The answer is d.** *(Hay et al, pp 702-703. Kliegman et al, pp 2197-2198. McMillan et al, pp 1892-1897. Rudolph et al, pp 1709-1710.)* The nonspecific findings of anorexia, polydipsia and polyuria, vomiting, and unexplained fevers, along with the more specific laboratory abnormalities of glucosuria but normal blood sugar, abnormally high urine pH in the face of mild or moderate serum hyperchloremic metabolic acidosis, and mild albuminuria in the presence of normal serum protein and albumin, suggest Fanconi syndrome (FS, also called global proximal tubular dysfunction). FS can be hereditary or acquired; hereditary forms are usually secondary to a genetic abnormality such as cystinosis, galactosemia, Wilson disease, and some mitochondrial abnormalities. A number of agents can cause FS, including gentamicin (or other aminoglycosides), outdated tetracycline, cephalothin, cidofovir, valproic acid, streptozocin, 6-mercaptopurine, azathioprine, cisplatin, ifosfamide, heavy metals (eg, lead, mercury, cadmium, uranium, platinum), paraquat, maleic acid, and glue sniffing (toluene). The mechanism of action of these agents is through acute tubular necrosis, alteration of renal blood flow, intratubular obstruction, or allergic reactions within the kidney itself. Many of these toxic effects are reduced or eliminated with removal of the offending agent. Renal tubular acidosis (RTA) type 1 is a distal RTA, and has a positive urine anion gap, as does RTA type 4. Type 3 is not a recognized type of RTA. Congenital nephrotic syndrome is a rare version of nephrotic syndrome, characterized by edema early in infancy, with hypoalbuminemia.

**284. The answer is c.** *(Hay et al, pp 10-11. Kliegman et al, pp 2255-2256. McMillan et al, pp 200-201, 1830. Rudolph et al, p 1739.)* In about 90% of boys during their first 3 years of life, adhesions between the glans and the prepuce lyse and the distal portion of the foreskin loosens, thus allowing the glans to be exposed. The collection of cellular debris under the foreskin, extruded from under the foreskin, is sometimes deemed abnormal by parents; it requires no treatment. Phimosis (inability to retract the foreskin) is normal in the first years of life and is considered physiologic; inability to retract the foreskin after an age when it would be expected (about 3 years) is considered pathologic phimosis. Paraphimosis is a painful condition occurring when the foreskin gets retracted and trapped behind the glans and, because of edema and venous congestion, cannot be relocated into its normal position. Hypospadias is defined as a urethral opening on the ventral surface of the penile shaft, usually with an absent ventral portion of the prepuce. The general arguments in favor of circumcision include religious reasons; reduced risk of urinary tract infections and sexually transmitted

diseases; and reduced rate of penile cancer, phimosis, and balanitis (inflammation of the glans). Phimosis is not associated with other abnormalities of the genitourinary system.

**285. The answer is a.** *(Hay et al, p 706. Kliegman et al, pp 2228-2234. McMillan et al, pp 1823-1824, 1839-1840. Rudolph et al, pp 1671-1673.)* The radiograph shows reflux into the ureters and into the kidney, with dilation of the renal pelvis, making the diagnosis of vesicoureteral reflux. The higher the reflux into the renal system, especially if the renal pelvis is dilated, the more likely it is for renal damage to occur; the grading system is based upon these radiographic observations. Grade I VUR is reflux of urine into an undilated ureter. Reflux into the ureter and collecting system without dilatation is called grade II. Grade III lesions have dilatation of the ureter and collecting system without blunting of the calyces. Grade IV lesions are characterized by blunting of the calyces, and grade V lesions demonstrate even more dilatation and tortuosity of the ureter. Low-grade lesions (grade I and grade II) are conservatively managed with close observation, daily low-dose antibiotics, and urinalyses and cultures every 3 to 4 months. Grade V lesions (and some grade IV lesions) require surgical reimplantation of a ureter if the findings persist. Lesions in between these two extremes are treatment dilemmas.

**286. The answer is b.** *(Kliegman, pp 2241-2242. McMillan, pp 1824-1826. Rudolph, pp 1735-1739.)* The findings described point to posterior urethral valves; the radiograph shows an area of obstruction and proximal dilatation of the bladder. The clinical picture of posterior valves ranges from that described in the question to severe renal obstruction with renal failure and pulmonary hypoplasia. Urinary tract infections are common complications in older children, and sepsis occasionally can be the presenting sign in afflicted newborns. Despite early recognition and correction of the obstruction, the prognosis in these children for normal renal function is guarded. Prenatal diagnosis is often accomplished because of widespread use of ultrasound.

Ureteropelvic junction obstruction, a common urinary obstruction in children that results in isolated hydronephrosis, can be found either on a prenatal ultrasound or after birth when the child is noted to have a mass, pain, or infection. Serial ultrasounds of the kidney assist in following the associated hydronephrosis. Prune belly syndrome occurs almost exclusively in males; it is diagnosed in a child with absent abdominal muscular tone, undescended testes, and urinary tract anomalies including hydronephrosis and dilated ureters and bladder. Duplication of the collecting system is often

asymptomatic, but can present with symptoms of obstruction and reflux. Horseshoe kidney is often an asymptomatic condition, and results when both kidneys are joined at the lower pole by a fibrous band of tissue or by renal parenchyma; symptoms may arise resulting from obstruction and/or reflux.

**287. The answer is a.** *(Kliegman et al, pp 2223-2227. McMillan et al, p 1839. Rudolph et al, p 1669.)* The patient in the question has acute lobar nephronia, which is in the middle of the spectrum between pyelonephritis and renal abscess. Patients have prolonged fever curves despite appropriate antibiotics. A CT scan is most useful in diagnosing nephronia, but a renal ultrasound can identify the process as well. Treatment is prolonged IV and then PO antibiotics. Shorter courses like the typical treatment for pyelonephritis can lead to recurrence and renal abscess. Surgery and biopsy are not necessary, and a DMSA scan, while identifying alterations in flow consistent with pyelonephritis, would not add to the patient's care. (Note that there is an error in the McMillan text referenced above, referring to labor [*sic*] nephronia in both the figure accompanying the text as well as the index.)

**288. The answer is b.** *(Hay, pp 698-700. Kliegman, pp 1989-1995. McMillan, pp 1532-1536. Rudolph, pp 1877-1885.)* Blood pressures in children must be interpreted in relation to the child's age and height. Nomograms are available to assist in all general texts and on governmental websites. Routine BP measurement is performed on children of age 3 and beyond and for subgroups of children at younger ages, including children who were premature, had frequent urinary tract infection, had umbilical artery catheters, and so on. Hypertension is usually asymptomatic, but with marked hypertension (that which is demonstrated by this 4-year-old) children can develop headache, dizziness, visual disturbances, irritability, and nocturnal wakening. Hypertensive encepha-lopathy can be preceded or accompanied by vomiting, hyperreflexia, ataxia, and focal or generalized seizures. Isolated facial nerve palsy can be the sole manifestation of severe hypertension. Isolated left ventricular hypertrophy, decreased urine output, and abdominal bruits are possible. When marked fundoscopic changes are present or when there are signs of vascular compromise, emergency treatment of the accompanying hypertension is warranted. Such hypertensive persons require immediate hospitalization for diagnosis and therapy.

**289. The answer is c.** *(Hay et al, pp 967-968. Kliegman et al, pp 2260-2261. McMillan et al, pp 1831-1832. Rudolph et al, pp 1740-1742.)* The child

in the photograph has an undescended testis, or cryptorchidism. By 6 months of life, 0.8% of boys born at term still have cryptorchidism. In adults with cryptorchidism, the risk of testicular malignancy is much higher than in unaffected men. Orchiopexy does not eliminate this risk, but repositioning the testes makes them accessible for periodic examinations. Whether the testes are brought into the scrotum or not, the sperm count can be reduced. The failure of the testes to develop, and their subsequent atrophy, can be detected by 6 months of age. Torsion of the testis is a potential risk because of the excessive mobility of the undescended testis. Orchiopexy helps to eliminate this problem. The incidence of UTI and epididymitis are not affected by the position of the testes.

**290. The answer is d.** *(Hay et al, pp 705-706. Kliegman et al, pp 2225-2226. McMillan et al, pp 438-439. Rudolph et al, p 1668.)* The mechanism by which urine is collected is paramount in determining the interpretation of cultures. No bacteria should grow in a properly obtained urine sample from a suprapubic tap unless infection is present. For children who undergo bladder catheterization, colony counts of $10^3$ to $10^4$ are considered significant. Ileal-loop bags are usually contaminated and are not useful. Bag specimens in smaller children (obtained by placing an adhesive, sealed, sterile collection system onto the perineum) can be helpful if the culture is negative. Contamination is common, especially in girls and in uncircumcised boys; positive cultures in this latter group of children, especially if they contain more than one organism, are suspect. In properly obtained midstream clean-catch urines, colony counts greater than $10^5$ in the asymptomatic child and colony counts of $10^4$ in the symptomatic child may be significant. Clean-catch urine samples in an uncircumcised male who cannot retract the foreskin are also suspect.

**291. The answer is b.** *(Hay et al, pp 689-690. Kliegman et al, pp 2173-2175. McMillan et al, pp 1856-1858. Rudolph et al, pp 1677-1681.)* Acute poststreptococcal glomerulonephritis follows a skin or throat infection with certain nephritogenic strains of group A β-hemolytic streptococci; the photograph demonstrates impetigo. Hematuria often colors the urine dark, and decreased urinary output can result in circulatory congestion from volume overload with pulmonary edema, periorbital edema, tachycardia, and hepatomegaly; these complications are avoided by fluid restriction. Acute hypertension is common and can be associated with headache, vomiting, and encephalopathy with seizures. Pyelonephritis and sexually transmitted diseases can cause

bloody urine, but rarely present with impetigo. IgA nephropathy is rare in black children and rarely presents with hypertension. Idiopathic hypercalciuria presents with blood and renal stones, but the other findings are distinctly unusual. It should be noted that while "rheumatogenic" strains of group A streptococci are only associated with pharyngitis, "nephritogenic" strains can be associated with either pharyngeal or skin infections.

**292. The answer is e.** *(Hay et al, pp 694-695. Kliegman et al, pp 2181-2182. McMillan et al, pp 2600-2602. Rudolph et al, pp 1696-1698.)* Hemolytic-uremic syndrome is most common in children younger than 4 years of age and is characterized by an acute microangiopathic hemolytic anemia, thrombocytopenia from increased platelet utilization, and renal insufficiency from vascular endothelial injury and local fibrin deposition. Ischemic changes result in renal cortical necrosis and damage to other organs such as colon, liver, heart, brain, and adrenal. Laboratory findings associated with hemolytic-uremic syndrome include low hemoglobin level, decreased platelet count, hypoalbuminemia, and evidence of hemolysis on peripheral smear (burr cells, helmet cells, schistocytes). Urinalysis reveals hematuria and proteinuria. A marked reduction of renal function leads to oliguria and rising levels of blood urea nitrogen (BUN) and creatinine. Gastrointestinal bleeding and obstruction, ascites, and central nervous system findings such as somnolence, convulsions, and coma can occur. In the past decade, infection by the verotoxin-producing *E coli* 0157:H7 has been implicated as a cause of hemolytic-uremic syndrome. This organism is epizootic in cattle. Outbreaks associated with undercooked contaminated hamburgers have been reported in several states. Roast beef, cow's milk, and fresh apple cider have been implicated as well. The Coombs test is not positive in this type of hemolytic anemia.

Henoch-Schönlein purpura is a vasculitis that presents with petechial-like rash on the lower extremities (but the platelet count is normal); it is not usually associated with fever, but microscopic blood in the stool or urine are possible as is colicly abdominal pain. IgA nephropathy can cause hematuria, but none of the other findings in the question typically are noted. Intussusception is seen in children of this age, but the lack of episodic colicky abdominal pain or emesis makes this diagnosis unlikely. Meckel diverticulum causes painless bloody stool without fever or other associated symptoms; it does not cause anuria.

**293. The answer is d.** *(Hay et al, pp 685-687. Kliegman et al, pp 2168-2171. Rudolph et al, pp 1659-1660.)* A number of pH-dependent substances can

impart a red color to urine. Use of phenolphthalein, a cathartic agent, or phenindione, an anticoagulant, can cause red urine; ingestion of blackberries, red Kool-Aid, or beets also can lead to red coloration ("beeturia"). None of these choices, however, would cause the heme test to be positive. Myoglobin, on the other hand, is the only choice listed that can test positive for heme. Myoglobinuria occurs in rhabdomyolysis with skeletal muscle damage and increased serum creatine kinase. Another possible cause of heme positive urine with no red cells is hemoglobinuria resulting from hemolysis. "Hematuria," therefore, should be confirmed by dipstick testing as well as by microscopic examination of urinary sediment.

**294. The answer is a.** *(Hay, pp 625-627, 689-690. Kliegman, pp 1015-1019, 2173-2175. McMillan, pp 1856-1858, 2543-2546. Rudolph, pp 847-850, 1687-1688.)* The figure accompanying the question depicts a red blood cell cast characteristically found in the urine of patients with glomerular disease. The fever, malaise, and weight loss as well as the arthritis involving mainly small joints are common findings of systemic lupus erythematosus (SLE). Raynaud phenomenon resulting in digital ulceration and gangrene in a few patients may also be seen. Not described in this patient is the oft-seen malar rash in a butterfly distribution across the bridge of the nose and the cheeks.

Simultaneous urine and serum electrolytes for bicarbonate determination hint at renal tubular acidosis that often presents with failure to thrive and unexplained acidosis, sometimes with repeated episodes of dehydration and anorexia. Poststreptococcal glomerulonephritis can present with red cell casts, but the symptoms usually develop 8 to 14 days after the acute throat infection. Urinary tract infections, especially of the upper system, can result in casts, but they would be expected to consist of white rather than red cells.

Elevation of the erythrocyte sedimentation rate may be found in SLE, but this is a nonspecific finding noted in many other chronic and acute inflammatory conditions; its diagnostic usefulness in this situation is limited.

**295. The answer is a.** *(Kliegman et al, p 2262. McMillan et al, p 1832. Rudolph et al, pp 1740-1741.)* The majority of all cases of acute scrotal pain and swelling in boys 12 years of age and older are caused by testicular torsion. If surgical exploration occurs within 4 to 6 hours, the testes can be saved 90% of the time. Too often, delay caused by scheduling imaging and laboratory tests, such as those outlined in the question, results in an unsalvageable gonad.

One of the more important diagnoses in the differential is epididymitis. It is often gradual in onset, and the physical examination usually will reveal the testicle to be in its normal vertical position and to be of equal size to its counterpart. Epididymitis usually presents with redness, warmth, and scrotal swelling (but normal cremasteric reflex); the pain is posterior (over the epididymis). Pain relief upon elevation of the testicle (Prehn sign) may be helpful to diagnose epididymitis although it is not specific.

**296. The answer is c.** *(Hay et al, pp 142-143. Kliegman et al, pp 2274-2278.)* The symptoms listed are those of vulvovaginitis, with nonspecific (or chemical) vulvovaginitis accounting for 70% of all pediatric vulvovaginitis cases. The discharge in nonspecific vulvovaginitis is usually brown or green and with a fetid odor. The burning with urination occurs because of contact between raw skin and urine. Further history in this case might reveal use of tight-fitting clothing (including swimsuits or dance outfits), nylon undergarments, prolonged bubble baths with contamination of the vagina with soap products, use of perfumed lotions in the vaginal area, or improper toilet habits (wiping of fecal material toward rather than away from vagina). Attention to these causative conditions usually results in resolution of the symptoms. The finding of a normal hymen, the history of a single caretaker, and the absence of behavioral changes all point away from, but do not completely exclude, sexual abuse. A vaginal examination under general anesthesia is usually required when a vaginal foreign body is suspected. Pinworms can infest the vagina, but symptoms usually include significant itching of the rectum and vagina. Estrogen cream, as well as antibiotic creams, are sometimes helpful in reducing the discomfort of vaginitis. In a sexually active adolescent (or in a sexually abused younger child), a variety of infectious agents, such as candida, *Chlamydia trachomatis, Trichomonas vaginalis, Gardnerella vaginalis,* and *Neisseria gonorrhoeae,* would be higher on the differential.

**297. The answer is b.** *(Hay et al, pp 690, 871. Kliegman et al, pp 1043-1045. McMillan et al, pp 2559-2562. Rudolph et al, pp 842-844, 1688-1689.)* Henoch-Schönlein purpura (HSP), or anaphylactoid purpura, is a systemic IgA-mediated vasculitis. The rash of anaphylactoid purpura most often involves extensor surfaces of the extremities; the face, soles, palms, and trunk are less often affected. Other significant symptoms include edema, arthralgia or arthritis, colicky abdominal pain with GI bleeding, acute scrotal pain, and renal abnormalities ranging from microscopic hematuria to acute renal failure. As HSP is a systemic vasculitis, any organ system can be affected.

The prognosis, however, is excellent, with only a small percentage of children going on to end-stage renal failure. Seizures are an uncommon complication of CNS involvement; more commonly, patients will complain of headache and will have behavioral changes. Unilateral lymphadenopathy and nonpurulent conjunctivitis are not typical of HSP (but are criteria for Kawasaki disease, another pediatric vasculitis).

**298. The answer is e.** *(Kliegman et al, pp 2263, 2264 (photo). McMillan et al, pp 1832-1833. Rudolph et al, p 1742.)* Varicocele, a common condition seen after 10 years of age, occurs in about 15% of adult males. It results from the dilatation of the pampiniform venous plexus (usually on the left side) due to valvular incompetence of the spermatic vein. Reduced sperm counts are possible with this condition; surgery may ultimately be indicated for infertility problems. Typically, this condition is not painful but can become tender with strenuous exercise. Its typical "bag of worms" appearance on palpation makes its diagnosis apparent in most cases. For a 13-year-old boy, reassurance and education seem appropriate.

A Doppler flow study of testes or a radionuclide scan might be indicated if the area were painful and the diagnosis of a torsion were being entertained. The child does not have evidence of a urinary tract infection (dysuria or fever) so a urinalysis and culture are unlikely to be helpful. If this sexually active child had painful testes and the diagnosis of epididymitis were being entertained, then ceftriaxone intramuscularly and doxycycline orally might be considered.

**299. The answer is d.** *(Hay et al, p 618. Kliegman et al, p 2264. McMillan et al, p 1832. Rudolph et al, p 1742.)* The description is that of a hydrocele, an accumulation of fluid in the tunica vaginalis. Small hydroceles usually resolve spontaneously in the first year of life. Larger ones or those that have a variable fluid level with time will likely need surgical repair. This is a common condition affecting 2% of males; thus, chromosomes are not indicated. Incision and drainage and antibiotics are not indicated for this developmental condition.

**300. The answer is a.** *(Hay et al, p 691. Kliegman et al, pp 2172-2173. McMillan et al, pp 1875-1878. Rudolph et al, pp 1699-1700.)* The most common type of hereditary nephritis is Alport syndrome. Clinically, patients present with asymptomatic microscopic hematuria, but gross hematuria is also possible, especially after an upper respiratory infection. Hearing loss, eventually leading

to deafness, is associated with Alport syndrome in 30% to 75% of cases. End-stage renal disease, as hinted in the question (the father was at a dialysis center), is common by the second or third decades of life. This syndrome is mostly commonly an X-linked dominant disorder, which explains the more severe course in males. Other findings include ocular abnormalities (30% to 40%) and, rarely, leiomyomatosis of the esophagus or respiratory tree.

Berger nephropathy (IgA nephropathy) results from IgA deposits within the mesangium of the glomerulus in the absence of systemic disease; it can be associated with microscopic or gross hematuria, but is not associated with a heredity condition resulting in deafness and end-stage renal disease. Idiopathic hypercalciuria, which may be autosomal dominant, causes recurrent gross hematuria, persistent microscopic hematuria, and complaints of dysuria or abdominal pain without stone formation. Membranous glomerulopathy is an unusual cause of hematuria in children occurring in the second decade of life when seen; it is the most common cause of nephritic syndrome in adults. It usually presents with signs and symptoms of nephrotic syndrome. Goodpasture syndrome results in pulmonary hemorrhages in addition to the signs and symptoms of glomerulonephritis; it is a rare disease in children.

**301. The answer is c.** *(Hay et al, pp 204-206. Kliegman et al, pp 2249-2250. McMillan et al, pp 670-672. Rudolph et al, pp 1742-1743.)* Nocturnal enuresis is involuntary voiding at night at an age when control of micturition is expected. Nocturnal enuresis can be split into two categories: primary nocturnal enuresis, when the child has never been dry at night; and secondary nocturnal enuresis, when the child has had a few months of dry nights before developing enuresis. By 5 years of age, most children (90%-95%) are completely dry during the day, and 80% to 85% are dry during the night. Over the years, the incidence of nocturnal enuresis decreases, dropping to 7% at 7 to 8 years of age, and down to 1% at 14. A careful history and physical examination will usually identify any potential organic causes. In most cases, no etiology is found. A family history is common. Minimal laboratory testing beyond screening urinalysis is indicated. The condition is more common in boys than in girls. Therapy is aimed at reassurance to the parents that the condition is self-limited, avoidance of punitive measures, and consideration of purchasing a bed-wetting alarm. Spontaneous cure rates are high regardless of therapy. Short courses of desmopressin (a synthetic analog of antidiuretic hormone) lead to control in 60% to 75% of cases while the patient takes the medication, and would be appropriate to consider in this boy and

in other situations in which patients need episodic control of their enuresis. However, desmopressin is not a cure, and episodes frequently return when the medication is stopped.

**302. The answer is b.** *(Hay et al, p 1044. Kliegman et al, p 2221. McMillan et al, pp 405-406, 1850-1851. Rudolph et al, p 1639.)* Oligohydramnios can cause a number of serious problems in the infant, including constraint deformities (such as clubfoot) and pulmonary hypoplasia. These infants have usually experienced intrauterine growth retardation and frequently have an associated serious renal abnormality. Ultrasound of the kidneys is important to rule out renal involvement as a cause of the oligohydramnios. None of the other testing would be expected to identify an etiology for the oligohydramnios and pulmonary hypoplasia, although this child's ultimate clinical course might necessitate additional testing. The finding of bilateral renal agenesis is termed Potter sequence.

**303-306. The answers are 303-f, 304-d, 305-a, 306-c.** *(Hay et al, pp 689-693, 703, 871. Kliegman et al, pp 1043-1045, 2173-2175, 2178-2179, 2184, 2190-2195, 2201-2202. McMillan et al, pp 1854-1856, 1858-1859, 1864-1874, 1904-1906, 1912, 2559-2562. Rudolph et al, pp 1677-1686, 1710-1713.)* Idiopathic hypercalciuria causes recurrent gross hematuria, persistent microscopic hematuria, and complaints of dysuria or abdominal pain without initial stone formation. Over time, however, stones may form in 15% of cases.

With acute glomerulonephritis, oliguria (often presenting with dark, cola-colored urine) frequently occurs as a direct consequence of the disease process itself; on occasion, it can be profound, with virtual anuria for several days. During this period of time, it is vital to monitor and restrict fluid intake lest massive edema, hypervolemia, and even pulmonary edema and death occur.

Elevated levels of cholesterol and triglycerides are common in nephrotic syndrome because of increased generalized protein synthesis in the liver (including lipoproteins) and because of a decrease in lipid metabolism due to reduced plasma lipoprotein lipase levels. In the nephrotic syndrome, albumin is lost in the urine and, despite increased hepatic synthesis, serum levels drop. The upper limit of protein excretion in healthy children is 0.15 g/24 h; in nephrotic syndrome, proteinuria can exceed 2.0 g/24 h. When the serum protein level drops low enough, the oncotic pressure of the plasma becomes too low to balance the hydrostatic pressure. Plasma volume, therefore, decreases as edema occurs. Periorbital edema in the morning and

scrotal edema in boys during the day is commonly reported. Endocrine and renal mechanisms then partially compensate by retaining water and salt. Overzealous monitoring and restriction of water and salt intake are usually not required.

Hypertension commonly accompanies glomerulonephritis, but only occasionally accompanies nephrotic syndrome. Diuretics are sometimes used in both nephrotic syndrome and glomerulonephritis with temporary effect, but are not curative. A combination of albumin infusions followed by a diuretic also has been used to temporarily decrease the edema in patients with nephrotic syndrome. Because both illnesses are usually self-limited, temporary measures are important. In all cases, blood pressure must be evaluated for the age of the child (eg, the 6-year-old girl with a blood pressure of 120/80 mm Hg is significantly hypertensive).

Bartter syndrome (also known as juxtaglomerular hyperplasia) is an autosomal recessive condition that causes hypokalemia, hypercalciuria, alkalosis, hyperaldosteronism, and hyperreninemia; blood pressure is usually normal. Clinical presentations occurring frequently between 6 and 12 months of age include failure to thrive with constipation, weakness, vomiting, polyuria, and polydipsia. Treatment is aimed at preventing dehydration, providing nutritional support, and returning the potassium level to normal.

Henoch-Schönlein purpura nephritis presents with a purpuric rash, arthritis, and abdominal pain, and has an associated glomerulonephritis that can cause gross or microscopic hematuria. IgA (Berger) nephropathy is the most common chronic glomerulonephritis. Initially thought to be benign, it is now known to progress over decades to chronic renal failure in many afflicted patients. IgA is found in the mesangium, but this occurs with other disease processes as well. The most common clinical finding is hematuria; episodic gross hematuria is frequently associated with a febrile illness.

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